

b² 4. (Amended) The process for polymerizing an olefin as claimed in any one of claims 1 to 3, wherein the activity is at least 1000 kg polyolefin/mole transition metal atom/hr.

REMARKS

Claims 1-4 remain pending in the application.

Claim Amendments

Claims 1 and 3 are amended to recite "reducing agent" as suggested by the Examiner. The phrase "Groups 3-11" in claim 1 is changed to "Groups 4 and 5" as disclosed at page 7, lines 5-6. The dependency of claim 3 is revised. Claim 4 is amended in the manner suggested by the Examiner. No new matter is added by this amendment.

Objections to Claims

The Examiner raises various objections to the claims. In response, various editorial amendments are made in claims 1, 3 and 4. The noted objections are thus believed to be moot and should be withdrawn.

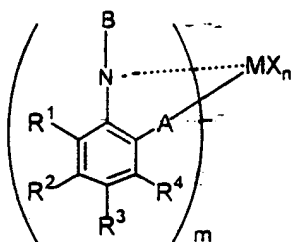
Rejection under 35 USC 102(a)

Claims 1-3 stand rejected under 35 USC 102(a) as being anticipated by JP 11-199592. This rejection respectfully is traversed to the extent deemed to apply to the claims as amended.

Applicants initially note that the Examiner relies on an abstracted version of the cited reference in support of the rejection. In an attempt to assist the Examiner in understanding those distinctions that exist between the claimed invention and the cited reference, applicants attach hereto a translation of claim 1 of the reference as well as a translation of Examples 5 and 7.

The cited reference discloses a transition metal compound A of formula I and a catalyst comprising

(A) the compound of formula I



(B) at least one of a compound selected from

(B-1) an organometal compound,

(B-2) an organoaluminum oxy-compound, and

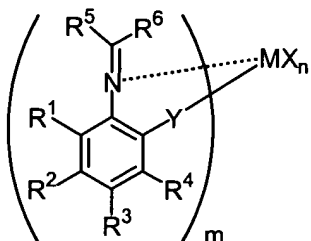
(B-3) a compound which reacts with the transition metal compound (A) to form an ion pair, and

(C) a carrier.

The above compounds will hereafter be referred to as (a), (b-1), (b-2), and (b-3) to avoid confusion with the recited components in applicants' claimed compound.

Applicants' claimed invention is directed to a polymerization process which occurs at a temperature of 50 to 200 °C by use of a polymerization catalyst comprised of

- (A) a transition metal compound represented by the following formula (I),



(I)

- (B-1) a reducing agent which reacts with the transition metal compound (A) to convert an imine structure moiety to a metal amide structure, and
- (B-2) a compound which reacts with the transition metal compound (A) to form an ion pair.

Thus, in the claimed invention, the particular combination of the compounds (B-1) and (B-2) together with the transition metal compound (A) of the formula (I) is provided.

The reference discloses a broad range of catalyst compounds, but does not in any way teach or suggest the specific combination of compounds (B-1) and (B-2) together with the selected transition metal compound (A), as defined in applicants' claim 1.

More specifically, the claimed compound (B-1) in the catalyst is distinguishable from the catalyst compounds of the cited reference, since compound (B-1) is used together with compound (B-2).

In fact, the reference discloses various combinations of the catalyst compounds, but when the reference uses compound (b-3) (which corresponds to applicants' claimed compound (B-2), only the following combinations are taught:

- (1) none of both (b-1) and (b-2)/(b-3)
- (2) (b-1) (organometal compound)/(b-3)
- (3) (b-2) (organoaluminum oxy-compound)/(b-3)
- (4) (b-1)/(b-2)/(b-3)

Of the above combinations, (1), (3) and (4) are not relevant to the specific combination (B-1) and (B-2) claimed by applicants because compound (B-1) of the invention excludes the organoaluminum oxy-compound used in the reference. However, the combination of the compounds of the reference (b-1) and (b-3) as in combination (2) above is identical to the specific combination of (B-1) and (B-2) of applicants' claimed compounds.

except that use of "comprising" by applicants does not exclude

However, it should be noted that in this combination, different types of the transition metal compound (i.e., compound (C-3) with a ligand having a N-Si bond) and compound (A-4) with a ligand having a N-S bond (A-4) as shown in Examples 5 and 7 of the reference are used in the catalyst system of the transition metal compound/organoaluminum compound/borate of the reference.

Such compounds (C-3) and (A-4) are outside the scope of the claimed transition metal compound (A). The claimed transition metal compound (A) of formula (I) is specific among the transition metal compounds (a) of the reference.

By use of the specific catalyst system used in the claimed process, an olefin polymer can be produced which has a dramatically high polymerization activity at high temperatures (50 °C or higher) as defined in claim 4. Such unexpected results are demonstrated in applicants' examples.

In summary, no teaching resides in the cited reference which would lead one of ordinary skill in the art to the use of a catalyst containing the component (B-1) having reducing ability selected from the group consisting of organometal compounds (b-1) of the reference, in combination with components (B-2) and the transition metal component (A), with the resulting effectiveness on polymerization activity at high temperature being attained.

In view of the above, it is submitted that the claimed invention is not anticipated by the cited reference, and the rejection should be withdrawn.

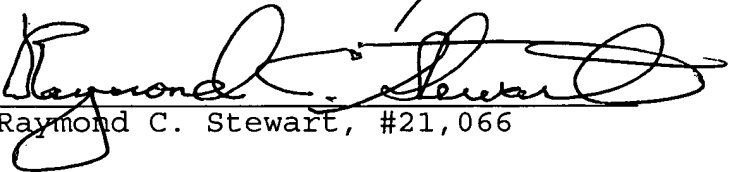
The application is accordingly believed to be in condition for allowance.


If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Docket No. 1155-0234P

Respectfully submitted,

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RCS/JWH
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Attachment: Translation of JP 11-199592 (claim 1, Exs. 5 and 7)

MARKED UP COPY OF CLAIM AMENDMENTS

The claims are amended as follows:

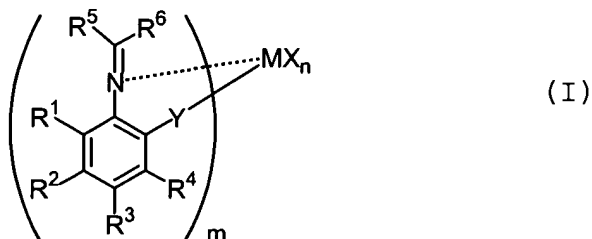
1. (Amended) A process for polymerizing an olefin comprising polymerizing or copolymerizing an olefin at a polymerization reaction temperature of 50 to 200 °C in the presence of an olefin polymerization catalyst comprising:

(A) a transition metal compound [represented by the following formula (I)],

(B-1) a [compound having a reduction ability] reducing agent which reacts with the transition metal compound (A) to convert an imine structure moiety to a metal amide structure, and

(B-2) a compound which reacts with the transition metal compound (A) to form an ion pair;

wherein said transition metal compound is represented by the following formula (I)



wherein M is a transition metal atom of Groups [3 to 11] 4 and 5 of the periodic table,

m is an integer of 1 to 6,

Y is an oxygen atom, a sulfur atom or a selenium atom, or a nitrogen atom having a substituent R⁷,

R¹ to R⁷ may be the same or different, [they] and are each a hydrogen atom, a halogen atom, a hydrocarbon group, an oxygen-containing group, a nitrogen-containing group, a boron-containing group, a sulfur-containing group, a phosphorus-containing group, a heterocyclic compound residual group, a silicon-containing group, a germanium-containing group or a tin-containing group, two or more of [them] R¹ to R⁷ may be bonded to each other to form a ring except for the case where R¹ and R⁵ or R¹ and R⁶ are bonded to each other to form an aromatic ring, and when m is 2 or greater, one group of R¹ to R⁷ contained in one ligand and one group of R¹ to R⁷ contained in other ligands may be bonded, and R¹s, R²s, R³s, R⁴s, R⁵s, R⁶s and R⁷s may be the same or different,

n is a number satisfying a valence of M, and

X is a hydrogen atom, a halogen atom, a hydrocarbon group, an oxygen-containing group, a nitrogen-containing group, a boron-containing group, a sulfur-containing group, a phosphorus-containing group, a halogen-containing group, an aluminum-containing group, a heterocyclic compound residual group, a silicon-containing group, a germanium-containing group or a tin-containing group, and when n is 2 or greater, plural groups

indicated by X may be the same or different, and plural groups indicated by X may be bonded to each other to form a ring.

3. (Amended) The process for polymerizing an olefin as claimed in claim 1 [or 2], wherein the olefin polymerization catalyst is a catalyst comprising the transition metal compound (A), the [organic metal compound] reducing agent (B-1), the compound (B-2) which reacts with the transition metal compound (A) to form an ion pair, and a carrier (C).

4. (Amended) The process for polymerizing an olefin as claimed in any one of claims 1 to 3, wherein the [yield of polyolefin per 1 mol of a transition metal atom contained in the transition metal compound (A) and 1 hour of a polymerization time is 1000 kg or more] activity is at least 1000 kg polyolefin/mole transition metal atom/hr.